RESPONSE ACTION WORK PLAN

FORMER P.R. MALLORY PLANT SITE
CRAWFORDSVILLE, INDIANA

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CRAWFORDSVILLE, INDIANA

October 1986
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CONESTOGA-ROVERS & ASSOCIATES

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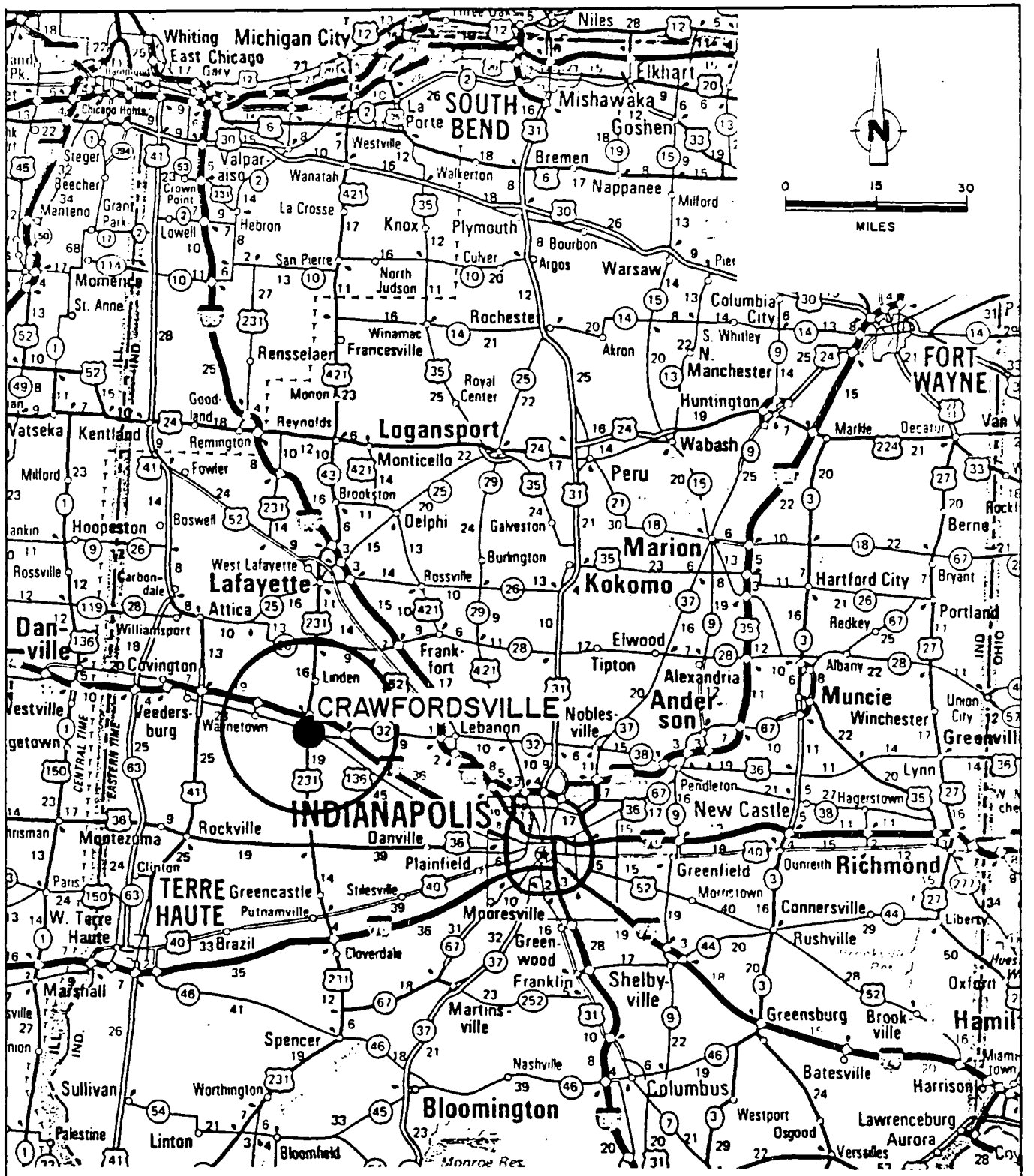
1.0 INTRODUCTION

1.1 GENERAL

The former P.R. Mallory Plant site referred to herein is located approximately three miles east of Crawfordsville, Indiana on the north side of State Road No. 32 (see Figure 1.1). The P.R. Mallory Company manufactured dielectric capacitors at the plant site from 1957 until 1969 when the plant was destroyed by fire.

The United States Environmental Protection Agency (EPA) issued an amended Administrative Order on August 20, 1986, which required the respondants. (Duracell International Inc., Terra Products, Superior Moving), to undertake emergency removal activities at the plant site.

Duracell proposes to implement the Response Action Work Plan (RAWP) presented herein in response to the amended Administrative Order issued by EPA. The RAWP presented herein addresses the requirements of the amended Administrative Order; in addition to EPA requirements, the RAWP also proposes a comprehensive investigation of the remainder of the site. The plan is comprised of the following activities: excavation and disposal of contaminated soil and debris; soil, stream sediment, surface water and groundwater sampling and analyses; health and



SOURCE: EASTERN STATES NORTH AND PROVINCE AMERICAN AUTOMOBILE ASSOCIATION 1981 EDITION

figure 1.1

SITE LOCATION

Crawfordsville, Indiana

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safety protocols to be implemented during all phases of the work; and a quality assurance/quality control program for all site activities.

A brief review of the history of the site and a description of the work completed to date are included in the sections which follow.

1.2 SITE BACKGROUND

On April 16, 1986, the Indiana Department of Environmental Management (IDEM) requested the EPA to investigate and initiate a removal action at the plant site. The request was made after IDEM representatives observed capacitors disposed of in a ravine and lying on the ground surface adjacent to the plant site. IDEM representatives sampled the oil in the capacitors and reported PCB concentrations in the oil were as high as 100 percent.

On April 19, 1986, EPA representatives conducted an assessment of the site which included a preliminary soil sampling program. The results of the sampling program indicated PCB concentrations, in the soil in the apparent capacitor disposal area, ranged from 325 parts per million (ppm) to 165,402 ppm. Based on the site assessment, an Administrative Order was issued on June 23,

1986 to Duracell, the former site owner and operator, and to Terra Products Inc., the current site owner. A meeting was held between Duracell and the State on June 26, 1986. Duracell representatives also met with the State and EPA officials on July 7, 1986 to review the Administrative Order and Duracell's proposed work plan. A subsequent survey of the site, initiated by Duracell, indicated the apparent disposal area was located outside the former P.R. Mallory property, on land occupied by Superior Moving.

Duracell submitted a proposed sampling and analysis plan entitled "Work Plan: Initial Site Screening" to the Agencies on July 14, 1986. Approval to proceed with the plan was issued by EPA on July 28, 1986.

On August 20, 1986, an amended Administrative Order was issued which named Superior Moving as a respondent and consequently provided access to the apparent disposal area.

1.3 WORK COMPLETED TO DATE

Preliminary work at the site was initiated prior to issuance of the amended Order to ensure the response action proceeded in an expeditious manner. All work completed to date has been carried out in accordance with the approved sampling plan and amended Administrative Order.

Construction of a security fence around the former plant site and disposal area began on August 11, 1986. The fence installation was completed on August 28, 1986. A sediment trap constructed of baled hay and an oil absorbent boom were installed in the ravine in conjunction with the installation of the fence. The general site layout is illustrated in Figure 1.2.

The preliminary sampling and analysis program was conducted at the plant site by Conestoga-Rovers & Associates (CRA). Samples were collected at the site on August 6, 1986 in accordance with the sampling plan approved by EPA. The results of the sampling program are presented in a report entitled, "Initial Site Screening: Sampling Program, Former P.R. Mallory Plant Site, Crawfordsville, Indiana", forwarded to EPA and the State on September 18, 1986.

The sampling and analysis program confirmed the presence of high concentrations of PCBs in the capacitor disposal area. PCB concentrations in the soil ranged from a maximum of 130,000 ppm in the main disposal area to 7,200 ppm adjacent to the incinerator. Concentrations of total dioxin varied from 40.1 ppb in the disposal area to 0.75 ppb in the stream bed; dibenzofuran concentrations varied from approximately 1.0 ppm to a maximum concentration of 5.1 ppm detected in the disposal area.

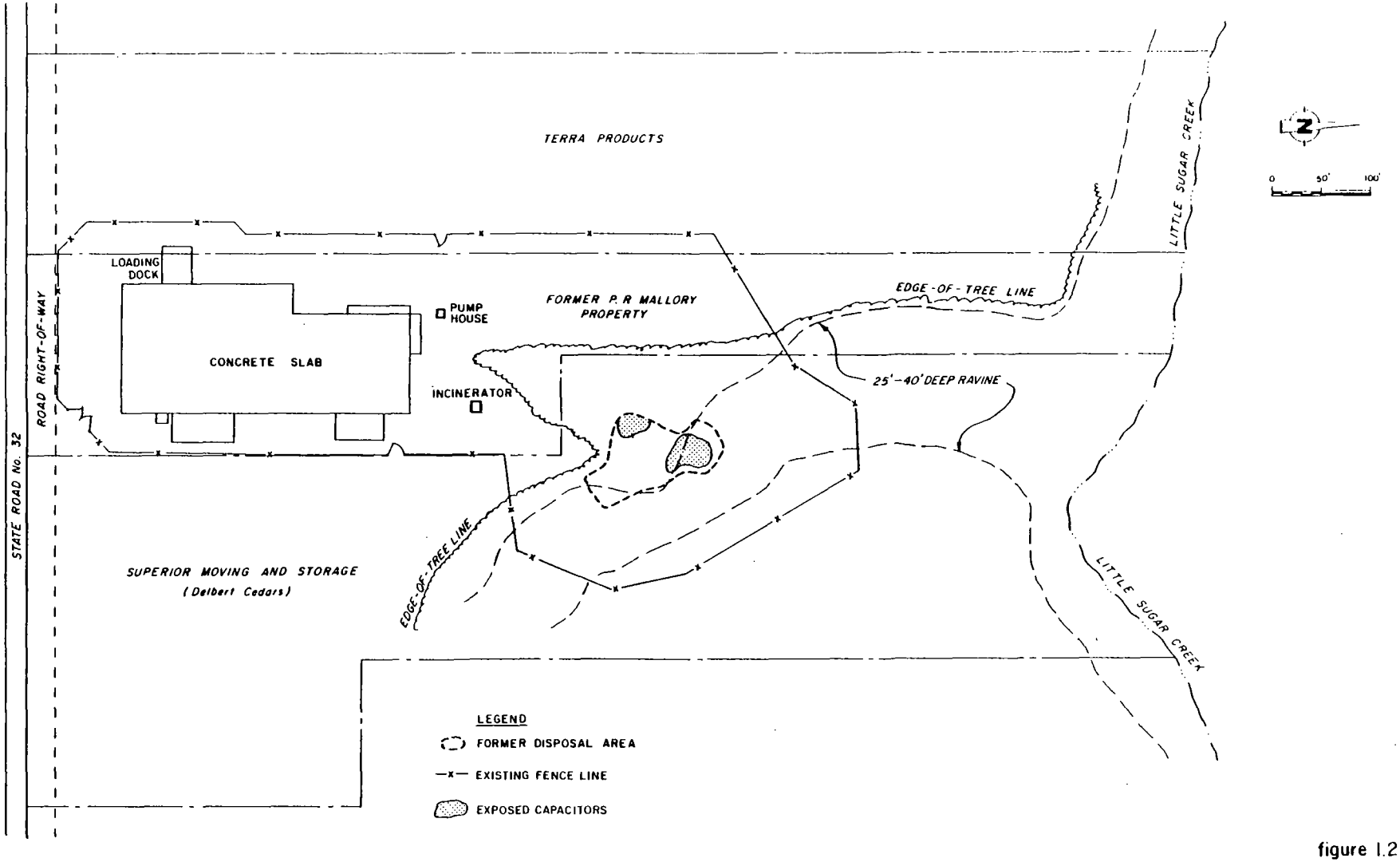

figure 1.2

EXISTING SITE CONDITIONS
FORMER P.R. MALLORY PLANT SITE
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2.0 RESPONSE ACTION WORK PLAN

2.1 GENERAL

The proposed RAWP will be carried out in various phases as presented herein. Each phase of the plan shall be carried out in strict accordance with the health, safety and security requirements outlined in Appendix A.

2.2 REMEDIAL ACTION CONSTRUCTION

Remedial action construction activities shall be carried out in two phases. The Phase I portion of the work will include excavation and on-site securement of contaminated surficial soil and debris as outlined below. Phase II remedial construction will be initiated following a thorough site assessment and determination of quantities and location of remaining residual contaminated material.

2.2.1 Phase I

All remedial site work shall be carried out in strict accordance with the health, safety and security requirements outlined in Appendix A.

Duracell will solicit bids from qualified remedial contractors to undertake this phase of the project. Work to be included in this phase of the project is as follows:

.1 Project Start-up

Prior to excavation of any material, the Contractor shall:

i) construct an equipment decontamination facility on site, including a storage tank for decontamination wash waters,

ii) provide personnel decontamination, personnel hygiene and office facilities on site,

iii) construct one concrete curbed, interim staging cell.

The interim staging cell shall be constructed on the existing concrete slab as illustrated on Figure 2.1. The surface of the existing slab shall be cleared; sharp protrusions or irregular surfaces shall be removed or smoothed with clean sand. A 40-mil high density polyethylene (HDPE) liner shall be placed directly on the prepared surface. A new concrete floor, curbs and sump shall be poured in place on top of the HDPE liner. The cell shall be

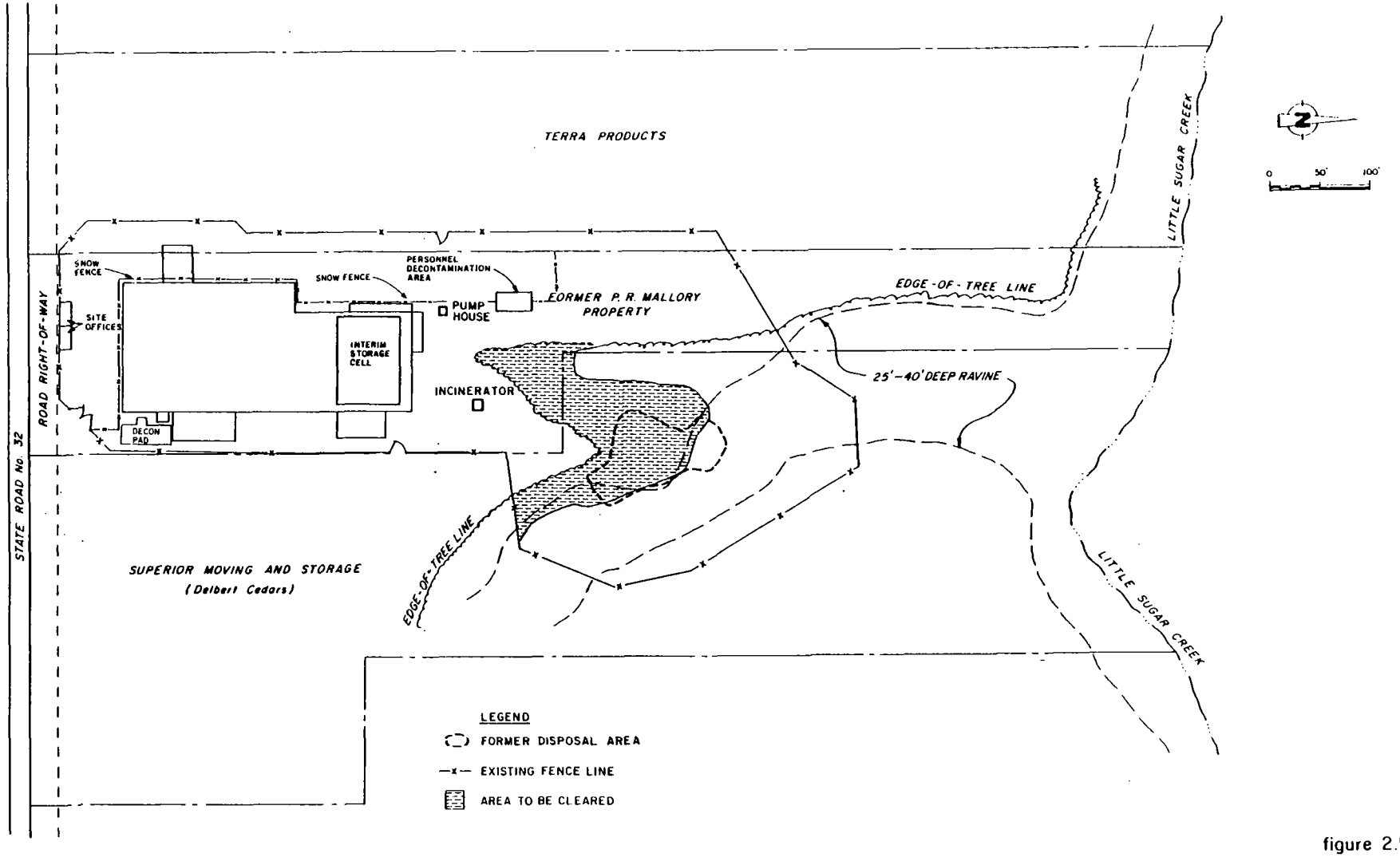

figure 2.1

PROPOSED SITE LAYOUT
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

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sized to accommodate approximately 900 cubic yards of soil and debris.

.2 Site Clearing

Approximately one-half acre of wooded land will be cleared to facilitate access to the disposal areas. Trees and brush will be cut a minimum of 18 inches above grade and loaded directly onto trucks for removal and disposal in a municipal landfill.

Stumps which must be removed will be considered potentially contaminated and will be placed in the interim staging cell.

.3 Excavation and Securement of Contaminated Soil and Debris

All visible capacitors will be removed and placed in drums prior to placement in lugger boxes situated on the existing concrete slab. The lugger boxes will be covered at the end of each work day.

Miscellaneous metal debris will be removed from the slopes and top of the ravine. Debris, other than capacitor components, will be decontaminated and disposed of in a municipal landfill. Wipe samples will be taken to

confirm decontamination procedures prior to off-site disposal.

Areas of apparent surficial disposal and all visibly oil-stained soil will be excavated in 6-inch to 12-inch lifts. Capacitors which are exposed during the excavation will be segregated from the soil and placed in drums. Excavated soil will be spread out in the interim staging cell to allow further segregation of capacitors excavated with the soil. The interim staging cell will be kept covered when material is not actively being placed or handled within the cell.

Following excavation and securement of capacitors and contaminated soil, the sediment trap and oil absorbent boom in the ravine shall be removed and placed in the interim staging cell. A new boom and sediment trap will be installed in the ravine. The boom and sediment trap will be inspected on a periodic basis. Collected sediment will be removed and secured in the interim staging cell as required.

Following placement of all contaminated soil and debris in the interim staging cell, the cell shall be covered with a 60-mil HDPE overliner anchored around the perimeter of the cell. The overliner will eliminate the potential for migration of contaminants from the cell. The excavation area shall be covered with a 40-mil HDPE liner following completion of Phase I excavation activities.

.4 Disposal of Capacitors

Following collection and securement of all surficial and excavated capacitors, the capacitors will be hauled to an off-site commercial incinerator facility for shredding and incineration. It is envisioned that capacitors will be taken to the Chemical Waste Management facility in Chicago for incineration. Handling and transportation of the capacitors shall be in accordance with applicable State and Federal regulations.

.5 Phase I Report

Following completion of Phase I excavation and securement activities, Duracell will submit an interim report to the Agencies, including:

i) identification of the site;

ii) a chronology and description of tasks completed to date;

iii) identification of any problems encountered and how the problems were resolved;

iv) a listing of quantities and types of materials removed and secured in interim storage; and

v) a compilation of all analytical results produced to date.

2.3 SURFICIAL SITE MATERIAL AND STREAM SAMPLING

2.3.1 General

In conjunction with the excavation and securement of soils and debris, Duracell will undertake the sampling and analysis program presented herein. The plan is designed to define the areal and vertical extent of residual soil and sediment contamination.

Data generated from the sampling program will be used to identify remaining residual significant contaminated material which will be excavated and secured on site as outlined in Section 2.8.

All sampling activities shall be carried out in strict accordance with the Health and Safety Plan presented in Appendix A.

2.3.2 Sampling Locations

A sampling grid will be established over the excavation area, adjacent land areas and in the drainage ditch from the plant site to Little Sugar Creek. In addition, background samples will be collected from the field south of the plant site and from a location several miles

away. The final location of samples will be approved in the field by the Agency's on-site representative.

Generally, all soil samples will be collected from a 50-foot grid around the plant site. Samples collected adjacent to the north edge of the plant and throughout the apparent disposal areas will be collected on a 25-foot grid. Samples to be obtained from the drainage ditch will be collected at approximately 50-foot spacings. Three additional samples will be collected from the northeast slope of the ravine.

The 50-foot grid spacing will be applied throughout the open areas of the site where there is little or no evidence of surface contamination. The 25-foot spacing applies to areas where surface contamination has been confirmed or is suspected. Samples collected outside the site will be based on a 100-foot spacing.

Stream sediment samples will be collected from the ravine adjacent to the site. The 50-foot spacing of samples along this drainage course will provide effective monitoring for any contamination since the contaminant distribution within the ditch would generally be linear and confined to the ditch invert.

Sediment samples will also be taken from Little Sugar Creek. One sample will be taken upstream and approximately four samples will be taken downstream from the confluence of the intermittent stream adjacent to the site and Little Sugar Creek. Surface water samples will be collected at all sediment collection locations, where possible. The surface water samples will be collected prior to collection of the sediment samples.

Approximately five cores will be taken from the existing concrete slab to permit sampling of the soil beneath the concrete slab. The cores from the concrete slab will also be analyzed for PCBs.

Proposed sample locations are illustrated in Figure 2.2. The final sample locations will be determined in the field with the Agency's on-site representative.

2.3.3 Sample Collection and Analysis

Soil samples shall be collected for analysis from the top six inches of soil at each sampling location. A second soil sample shall be collected from the underlying six inches and stored for future analysis, if required.

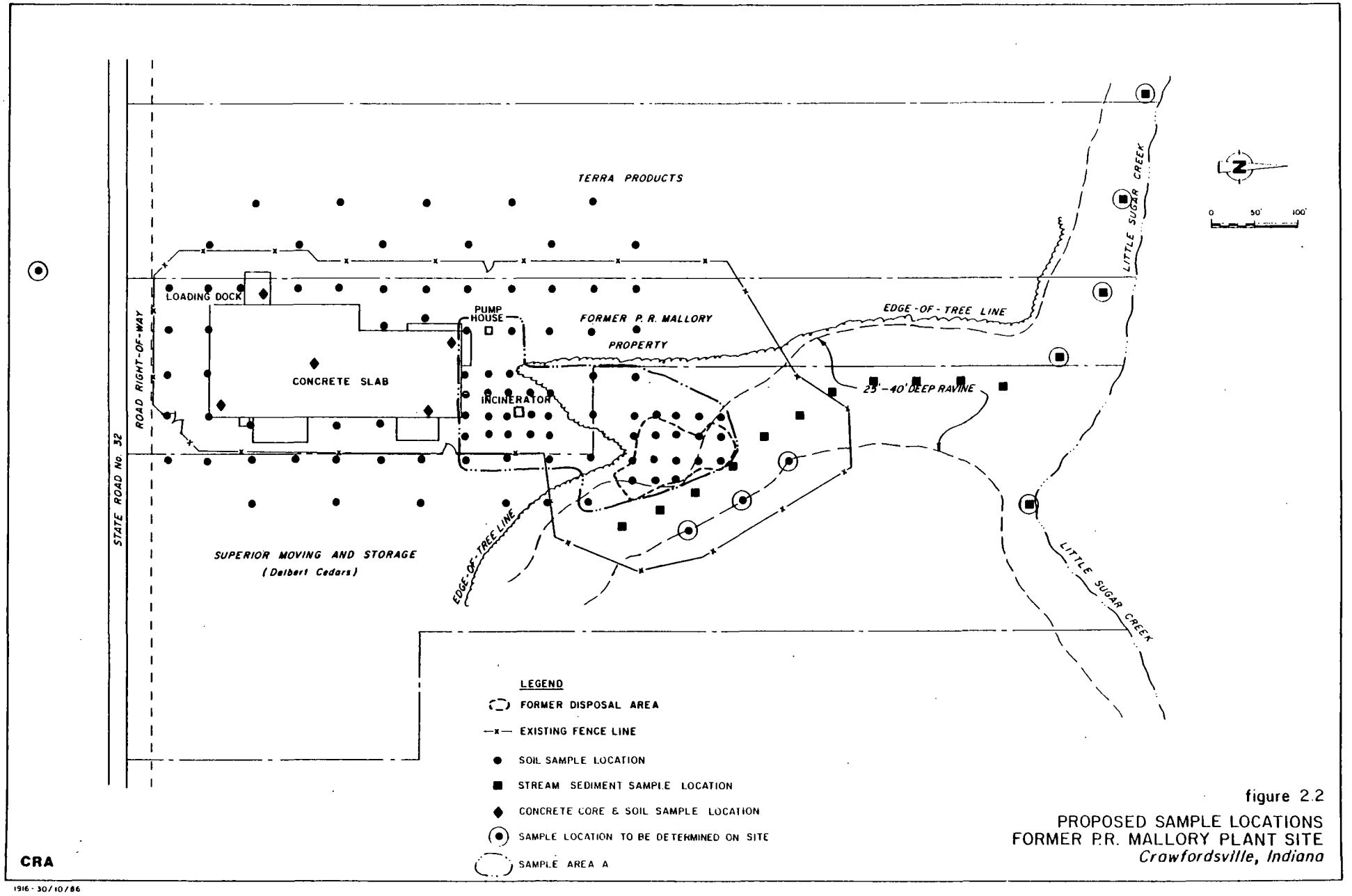

figure 2.2
PROPOSED SAMPLE LOCATIONS
FORMER P.R. MALLORY PLANT SITE
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All surface samples collected shall be analyzed for total PCBs. Ten percent of all samples shall be analyzed for total dioxins and total dibenzofurans. Included in the ten percent of samples analyzed for total dioxins and total dibenzofurans will be: one background sediment sample from Little Sugar Creek; one downstream sediment sample from Little Sugar Creek; and one sediment sample from the ravine. Analysis of the samples taken from the underlying six-inch layer will be initiated if detectable concentrations of contaminants are found in the surface soil sample.

In addition to the PCB/dioxin/furan analysis, ten percent of all samples collected from sample Area A, as illustrated on Figure 2.2, shall be analyzed for priority pollutant base, neutral and acid extractables, and volatile organic compounds.

Soil samples shall be collected and analyzed in accordance with the sampling and analysis protocols presented in Appendix B.

2.4 HYDROGEOLOGICAL INVESTIGATION

2.4.1 Objectives

A hydrogeological investigation will be conducted at the site to determine the impact, if any, resulting from previous site activities. As there is limited data pertaining to the geology and hydrogeology of the site, it is not possible, at this time, to design an all encompassing groundwater monitoring program that would totally characterize the site. Data provided by the initial investigation may dictate that an additional phase of hydrogeologic investigation be conducted.

The objectives of the initial hydrogeologic investigation are as follows:

a) to characterize the geology at the site and determine the potential pathways of contamination,

b) determine the lateral and vertical direction of groundwater flow, as well as the flow velocity,

c) determine the extent and degree of groundwater contamination, if any, and the potential for lateral and vertical migration of contaminants, and

d) determine if additional work is required to assess the site.

2.4.2 Existing Data Review

The initial task of the hydrogeological investigation will be the collection, compilation and evaluation of existing geological and hydrogeological data. The type of data that will be collected are:

- geological maps and reports,
- water resources reports,
- water well records for wells located within a one-half mile radius of the site, and
- the water well record and testing data for the abandoned well located on the site.

These data will be thoroughly reviewed to determine, to the degree possible, the stratigraphic and hydrogeologic setting of the site. The review of existing water well records will define the major water supply aquifers in the area, and establish the potential impact of any groundwater contamination.

Once the review of the existing data is completed, any data gaps which would prevent the objectives

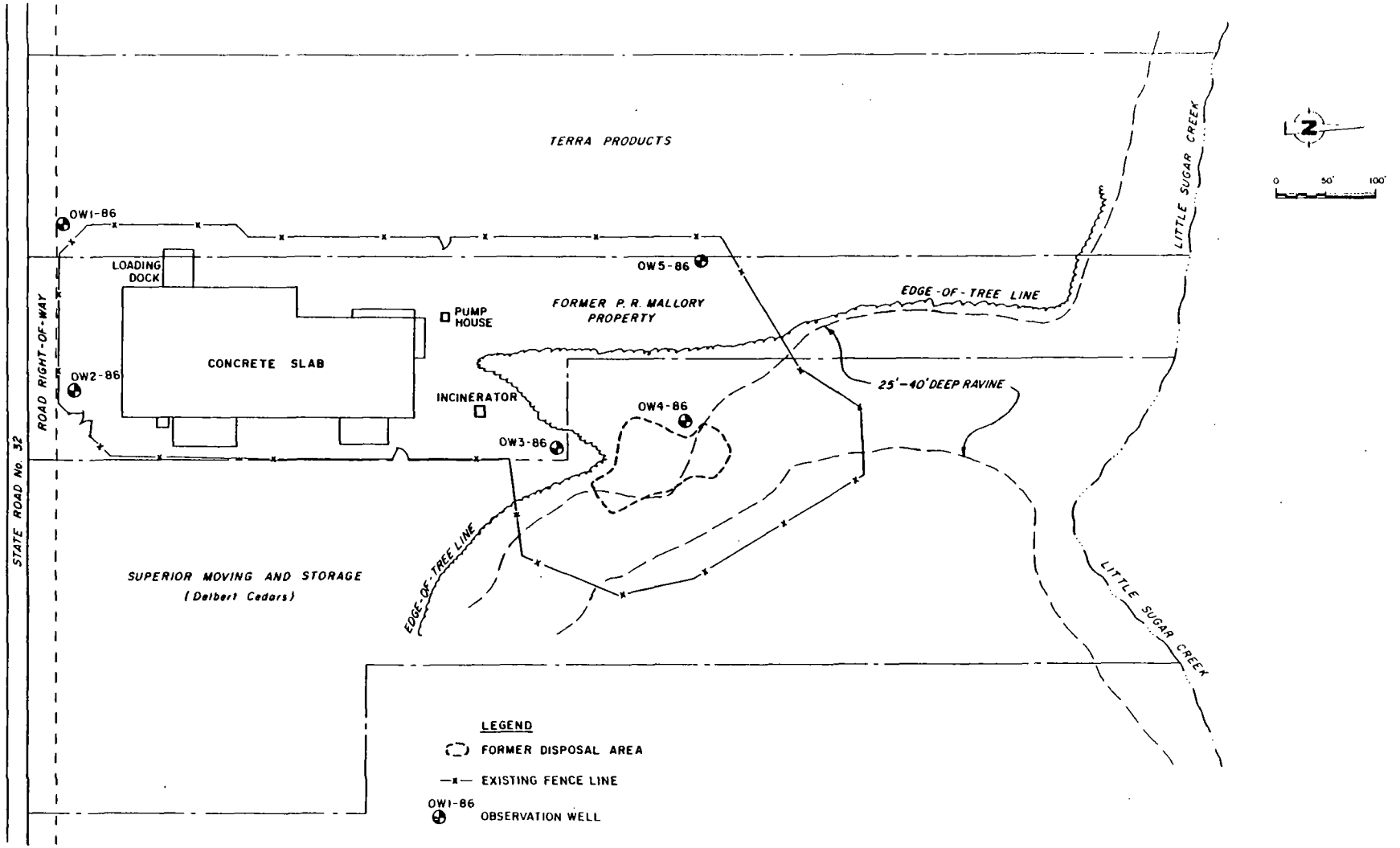

figure 2.3

PROPOSED OBSERVATION WELL LOCATIONS
FORMER P.R. MALLORY PLANT SITE
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TABLE 2.1

PROPOSED OBSERVATION WELLS
FORMER P.R. MALLORY SITE
CRAWFORDSVILLE, INDIANA

Observation Well No.	Location	Purpose
OW1-86 (Nest)	Southwest property boundary	stratigraphic definition, groundwater flow directions, background water quality
OW2-86	Southeast property boundary	shallow groundwater flow direction
OW3-86	Property line between incinerator and the disposal area	define horizontal groundwater flow, presence of contamination and contaminant flux
OW4-86 (Nest)	Off-site disposal area	define vertical gradient and the potential for downward contaminant migration
OW5-86	Northwest corner of fenced area	define horizontal groundwater flow, presence of contamination, if any
Existing Water Well	Northwest corner of concrete slab	groundwater flow in deep gravel aquifer

of the investigation from being achieved will be identified. Also, the drilling and monitoring well installation program proposed in the following section of this report will be reviewed in light of the existing data base to determine if modifications are required.

A preliminary report will be submitted at the completion of the data review task.

2.4.3 Test Drilling and Monitoring Well Installation

Preliminary information provided by the IDEM indicates that in excess of 130 feet of unconsolidated material overlies the bedrock at the site. The bedrock consists of a siltstone/shale sequence of the Borden Group. It appears that nearby water wells are completed in a continuous gravel deposit, which occurs at a depth of approximately 113 feet beneath the site. The log of the abandoned well on site indicates that "clay" overlies the gravel aquifer. It is likely that discontinuous permeable zones exist within this unit, but have not been identified.

No data is available on the shallow groundwater flow system at the site, however, surface topography indicates that the groundwater flow within the shallow overburden is likely in a northerly direction towards

the ravine that runs along the eastern property boundary and Little Sugar Creek, or northwesterly directly towards Little Sugar Creek.

The following program has been developed based upon this information. If it is found that conditions are different following completion of the existing data review, the program will be revised following consultation with and approval by the Agencies.

It is proposed to install seven observation wells at five locations. The proposed locations are shown on Figure 2.3. The details of the proposed observation wells and their purposes are summarized on Table 2.1. All new observation wells will be installed, developed and response tested according to the procedures outlined in Appendix C.

In order to better define the surficial stratigraphy at the site, a borehole will be advanced at the location of OW1-86 to the deep gravel aquifer. Continuous split spoon samples of the surficial materials will be taken for the first 15 feet, and at five-foot intervals thereafter. Based upon the examination and description of soil samples, zones for observation well completion will be selected.

An observation well nest will be installed at OW1-86, with one well installed below the water table in the first permeable zone encountered and one in the deep gravel aquifer. Each well will be installed in a separate hole, as described in Appendix C. The well nest at OW1-86 will provide information regarding the hydraulic head in the upper aquifer and the vertical gradients. Also, OW1-86 should provide background data with respect to water quality.

At the location of OW2-86 it is proposed to install an observation well in the upper aquifer only. The main purpose of OW2-86 is to determine the direction of groundwater flow in the upper aquifer. A borehole will be advanced to a depth of approximately 50 feet. If it is found that the geology at OW2-86 is substantially different than that encountered in OW1-86, then the borehole will be extended to the underlying deep gravel aquifer.

OW3-86 is located at the property boundary, in an area that is assumed to be downgradient of the plant site and incinerator. A borehole here will be extended to a depth of fifty feet to define any permeable zones within the till. An observation well will be installed below the water table in the first permeable zone encountered. The purpose of the observation well here is to determine groundwater flow directions and the contaminant flux, if any, off site.

OW4-86 is located adjacent to the apparent disposal area. A borehole here will also be drilled to the deep gravel aquifer and a well nest will be installed. While it is expected that contaminated groundwater will discharge directly into the adjacent ravine, it is necessary to verify the vertical hydraulic gradients at this location to determine the potential for the downward migration of contaminants.

OW5-86 is located at the northwest corner of the fenced area. A borehole here will be drilled to a depth of 50 feet for stratigraphic definition, and an observation well will be installed within the first permeable zone encountered. The purpose of this well is to determine the shallow groundwater flow directions and the presence, if any, of groundwater contamination.

Selected soil samples, including samples taken from the screened intervals, will be submitted for grain-size analysis. The grain-size data will be used to estimate hydraulic conductivity. Shelby-tube samples of the confining till will be taken for laboratory determination of hydraulic conductivity.

After completion of the drilling program, the observation wells will be developed by pumping and bailing to ensure hydraulic and chemical stability. Response tests will

also be conducted on all wells to determine the horizontal hydraulic conductivity of the screened materials. All wells will be field surveyed for horizontal and vertical control.

The distribution of the proposed observation wells will allow a preliminary evaluation of groundwater hydraulics at the site. Horizontal flow within any permeable zones within the till will be determined, along with linear flow velocities. The vertical head gradients and the hydraulic conductivity of the till will be used to calculate groundwater flux through this unit.

2.4.4 Groundwater Monitoring

It is proposed that three rounds of water samples be collected from all observation wells installed during this program. The first round will be collected immediately after well development and stabilization; the second round and third round, if necessary, will be in subsequent months. Samples will also be taken from the abandoned well on site; sample collection protocols are described in Appendix B.

The preliminary site screening and sample analyses have determined the presence of PCBs, dioxin and dibenzofurans. Similar plant operations typically used

solvent compounds in the degreasing portion of the capacitor manufacturing process. Therefore, it is proposed to analyze for priority pollutant volatiles in addition to PCBs, dioxin and dibenzofurans.

Also, in order to determine the inorganic chemistry of the groundwater and its hydrochemical facies, the first round of samples will be analyzed for the following general groundwater quality parameters:

Sodium (Na)
Potassium (K)
Calcium (Ca)
Magnesium (Mg)
Sulphate (SO_4)
Chloride (Cl)
Bicarbonate (HCO_3)
Carbonate (CO_3)
Alkalinity
Hardness
Total Dissolved Solids

The third round of groundwater sampling will be deleted if significant levels of PCBs, dioxin, dibenzofuran and/or priority pollutant volatiles are not detected in the first two rounds.

2.5 AMBIENT AIR SAMPLING

Ambient air sampling will be completed for both particulate and gaseous phased PCB analysis. A total of four samples will be collected including one sample adjacent to the existing concrete slab, two samples from the apparent disposal area and one background sample.

Air sampling protocols are presented in Appendix B.

2.6 GEOPHYSICAL SURVEY

A geophysical survey of the site will be conducted in conjunction with Phase I construction activities. The survey will be designed to determine whether additional buried disposal areas are present on site. The geophysical survey will include: a review of surficial geology, soil, topographic and hydrogeological reports and maps; a magnetometer survey of the site; and data mapping and interpretation.

A series of background magnetometer measurements will be collected off site. On-site magnetometer measurements will be taken on a 20-foot grid pattern. The grid spacing will be reduced to ten feet in

areas where significant readings are recorded. Magnetometer measurements will be taken at proposed observation well locations prior to well installation; site measurements will be completed following termination of Phase I excavation activities.

Existing above and below ground utilities and services will be identified. All data will be mapped and interpreted. Anomalous readings and map delineations will be explained in terms of possible cause. The results will be used to determine areas where additional investigation and possible excavation is required.

2.7 ADDITIONAL SITE INVESTIGATION

Several test trenches will be excavated adjacent to the existing concrete slab to locate and identify additional physical structures which may be associated with the plant site.

A backhoe will be used to excavate a trench along the north edge of the slab to determine if an underground storage tank is buried beneath the slab and to search for drain lines which may extend from the slab. A similar trench may be cut along the southeast corner of the slab to determine if a partial basement or crawl space is

located beneath the slab. Additional trenching work may be ordered depending upon the results of the initial excavation and the geophysical survey.

2.8 PHASE II REMEDIAL CONSTRUCTION

Following completion of the site sampling program and receipt of analytical results, Duracell will prepare and submit to the Agencies, a report outlining the following:

i) action levels for contaminant removal;
ii) an estimate of the quantity of material to be removed;
iii) an outline of the scope of work to be initiated to meet these action levels; and
iv) a description of proposed on-site staging facilities to contain the material to be removed.

Following Agency review and approval of the plan, Duracell will submit detailed plans and specifications for the on-site staging facility and Phase II excavation activities to the Agencies.

Following Agency review and approval of the detailed plans and specifications, Duracell will solicit bids from remedial contractors qualified to undertake this phase

of the project. This work will be completed in the shortest time possible.

At this time it is anticipated that a Recoverable Monitored Containment Structure (RMCS) will be constructed on the existing concrete slab for the temporary staging of contaminated material. The RMCS will be comprised of a concrete containment structure, lined with HDPE and sloped to a single sump. A pre-engineered metal clad building will be constructed on the perimeter concrete contaminant wall to ensure the facility is totally enclosed. Material placed within the facility would be covered with an HDPE overliner for additional protection.

2.9 SITE RESTORATION

Following completion of all excavation activities, excavated areas will be backfilled with clean fill and graded to re-establish pre-excavation drainage patterns. Disturbed areas will be revegetated to minimize erosion.

Security fencing will be dismantled and all fence posts will be removed.

2.10 FINAL REPORT

Following completion of site activities, Duracell will submit a final report to EPA including:

i) identification of the site;

ii) a chronology and description of the actions undertaken;

iii) identification of problems encountered and how the problems were resolved;

iv) a listing of quantities and types of materials removed and their ultimate disposition;

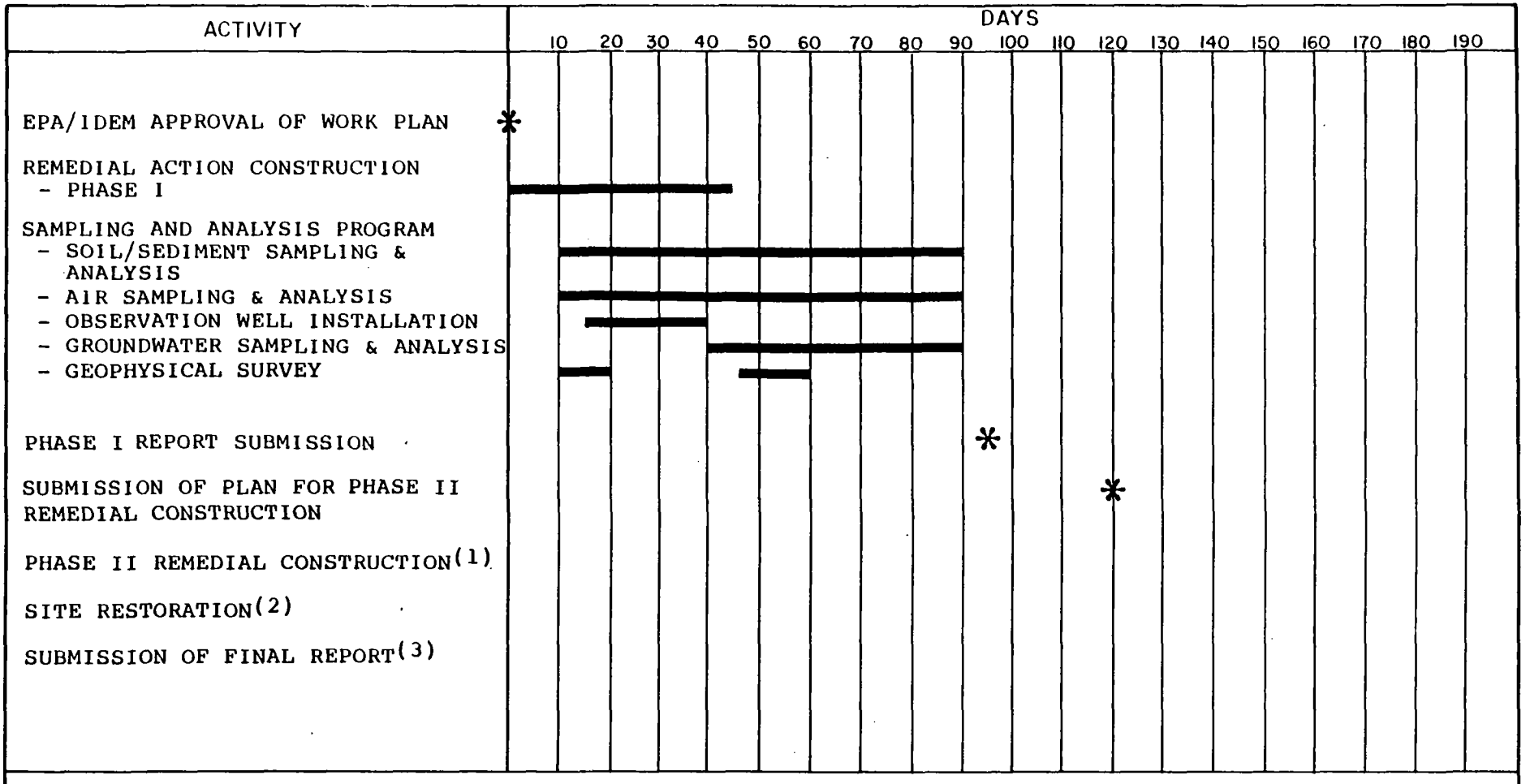
v) a compilation of all analytical results produced during the program; and

vi) recommendations for any additional actions which may be required.

3.0 PROJECT SCHEDULE

The proposed project schedule is illustrated in Figure 3.1. Implementation of the schedule is dependent upon Duracell's receipt of required permits and approvals; and favourable weather conditions to permit excavation and securement of contaminated materials without causing endangerment to the general public or site personnel.

Final site restoration including placement and compaction of fill, placement of topsoil and revegetation will be scheduled following completion of Phase II remedial action construction activities.



NOTES:

(1) PHASE II REMEDIAL CONSTRUCTION SCHEDULE TO BE CONFIRMED FOLLOWING PLAN APPROVAL.

(2) TO BE SCHEDULED UPON COMPLETION OF PHASE II ACTIVITIES.

(3) TO BE SUBMITTED FOLLOWING COMPLETION OF PHASE II SITE ACTIVITIES AND SITE RESTORATION.

figure 3.1

PROPOSED SCHEDULE
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

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4.0 DETAILED SPECIFICATIONS AND WORKING DRAWINGS

Detailed specifications and working drawings for the response action to be implemented will be submitted to the Agencies in conjunction with the submission of the RAWP.

5.0 QUALITY ASSURANCE PROJECT PLAN

A Quality Assurance Project Plan (QAPP) will be prepared for the proposed response action at the site. The QAPP will be implemented for the duration of the response action and will be submitted to the Agencies for approval prior to initiation of site sampling.

The QAPP will be consistent with the intent and stated goals of the Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAM-005/80) prepared by the USEPA.

APPENDIX A

HEALTH AND SAFETY PLAN/

ACCIDENT PREVENTION PROGRAM

TABLE OF CONTENTS

A. ON-SITE HEALTH AND SAFETY PLAN/ ACCIDENT PREVENTION PROGRAM

A.1 GENERAL

Construction and sampling activities at the site will involve contact with potentially contaminated soils. All on-site personnel shall conform to the Health and Safety Plan presented herein. This Health and Safety Plan provides for a safe and minimal risk working environment for on-site personnel. It also provides for emergency response procedures to minimize the potential for adverse impact of construction activities on the general public.

A.2 BASIS

The Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) provide the basis for the safety and health program. Additional specifications within this Section are in addition to OSHA regulations and reflect the positions of both the EPA, the National Institute for Occupational Safety and Health (NIOSH) regarding procedures required to insure safe operations at abandoned hazardous waste disposal sites.

The safety and health of the public and on-site personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work. The Engineer and the on-site Safety Officer will be responsible for decisions regarding when work will be stopped or started for health and safety considerations.

A.3 SAFETY OFFICER

A Site Safety Officer who will, as a minimum, be an Industrial Hygiene Technician with qualifications in occupational health, will be on site during all major construction activities involving excavation or securement of contaminated material. The Site Safety Officer will be required to report directly to a Certified Industrial Hygienist who will be responsible for implementing and overviewing the Health and Safety Plan on a part-time basis.

The Certified Industrial Hygienist will:

a) Be responsible for implementation of the Health and Safety Plan at the start-up of potentially hazardous work;

b) Be responsible for a pre-construction indoctrination of all on-site personnel with regard to the safety plan and

other safety requirements to be observed during construction, including:

i) potential hazards,

ii) personal hygiene principles,

iii) personnel protective equipment,

iv) respiratory protection equipment usage and fit testing, and

v) emergency procedures dealing with fire and medical situations;

c) Oversee the Site Safety Officer's activities on a part-time basis and be available on an as-needed basis for emergency situations.

The Safety Officer will:

a) Be responsible for daily enforcement and monitoring of the Health and Safety Plan;

b) Be responsible for assisting the Certified Industrial Hygienist in the pre-construction indoctrination of all on-site personnel;

c) Be responsible for notifying the Engineer prior to initiation of any hazardous work;

d) Be responsible for the maintenance of separation of "Exclusion" (potentially contaminated) and "Clean" (uncontaminated) areas as described hereafter; and

e) Be responsible for maintenance of the emergency contingency plan.

A.4 MEDICAL SURVEILLANCE

In accordance with requirements detailed in 29 CFR 1910.134, all site personnel directly involved in excavation and securement of contaminated material will receive medical surveillance by a licensed occupational physician prior to performing work on site and at the completion of the project.

Personnel medical records will be maintained by the Contractor and/or the Engineer at the project site office, and will be available to appropriate authorities upon request.

Personnel involved in on-site work for the duration of the project will undergo medical surveillance by a licensed physician supplied by the Contractor. The medical surveillance will include as a minimum the following:

a) Medical/Occupational Questionnaire

b) Full Physical Examination

c) Vitals (height, weight, blood pressure, pulse)

d) Screening Audiometric Test with Otoscopic Exam for Wax

e) Visual Acuity Measurement, including Color Perception

f) Pulmonary Function Test (Spirometry - FVC and FEV 1.0)

g) Resting EKG

h) Chest X-Ray (PA) Read by Board Certified Radiologist (every two years)

i) Laboratory Analysis

j) Blood Chemistry Profile*

k) Complete Blood Count with Differential and Platelet Evaluation, including WBC, RBC, HGB, Hematocrit

l) Urinalysis with Microscopic Examination

A.5 TRAINING

All personnel assigned to or entering the site shall complete training or refresher sessions to ensure that they are capable of and familiar with the use of safety,

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* Minimum Blood Chemistry Profile: Calcium, Phosphorous, Glucose, BUN, Uric Acid, Cholesterol, Total Protein, Albumin, Total Bilirubin, Direct Bilirubin, Indirect Bilirubin, Alkaline Phosphatase, LDH, SGOT, Sodium, Potassium, Chloride, CPK, SGPT, CGT, Creatinine, Triglycerides, Osmolality, Bun/Creatinine Ratio, Globulin, A/G Ratio, Beta Cholesterol, (LDL)

health, respiratory and protective equipment and with the safety and security procedures required for this site.

A Certified Industrial Hygienist will provide a training program on site for all site personnel prior to commencing work within the Exclusion Zone. This training program will address as a minimum the following topics:

a) Acute and chronic effects of the toxic chemicals at the site.

b) Routes of exposure (skin penetration, inhalation, and ingestion) and specific nature of operations which could result in exposure.

c) Need for personal protection (effectiveness and limitations).

d) Proper use and fitting of respirator (to include drills in donning and using emergency respirator).

e) Medical Surveillance Program.

f) Prohibitions (outside Clean Zone), including:

(i) Glasses or facial hair, such as beards and long sideburns, which interfere with respirator fit

(ii) Contact lenses

(iii) Eating, drinking, smoking, chewing

(iv) Personal articles, e.g., watches, rings, etc.

(v) Working when ill.

g) Work zones established at the site.

h) Engineering controls and safe work practices associated with employee's work assignment, including dust control measures and use of buddy system.

i) Personnel and equipment decontamination procedures.

j) Emergency response and emergency alarm definitions.

k) Basic operational safety, emphasizing hazards expected on site.

The training of all personnel will be recorded on Training Logs which will be maintained by the Safety Officer. The Training Logs will include provisions for the following information:

a) Employee and visitor's name (attendance checked and signature).

b) Time allocation in training session.

(i) Topics covered

(ii) Materials used

(iii) Equipment demonstration

(iv) Hands-on equipment practice for each employee

(v) Prohibitions covered

(vi) Buddy-System Explanation

(vii) Miscellaneous.

c) Date and Place.

The Safety Officer will be responsible for ensuring that personnel not successfully completing the required training are not permitted to enter the site.

Exceptions to the above will be made only by the Engineer for authorized visitors.

A.6 RESPIRATOR PROGRAM

All on-site personnel will receive training in the usage of, and be fit tested for, both half and full face respirators. This may include canister/cartridge and supplied air types, as appropriate.

Personnel working on site will be required to wear respiratory protection as determined by air monitoring and as instructed by the Safety Officer. As a minimum, all personnel will wear full face air purifying respirators when working in the Exclusion Zone.

A.7 WORK AREAS

Specific work areas will be delineated by snow fence as outlined below:

a) Exclusion Zone - This zone shall include all areas where potentially contaminated soils or materials are to be excavated, handled, spoiled or covered, and all areas where contaminated equipment or personnel travel.

   The level of personnel protective equipment required in this area will be determined by the Safety Officer after monitoring and on-site inspection.

   The Exclusion Zone will be clearly delineated in the field prior to commencing site work, by temporary snow fencing with warning signs spaced around the perimeter of the Zone warning of a hazardous work area.

b) Contamination Reduction Zone - This zone will occur at the interface of Exclusion Zone and Support Zone and will provide for the transfer of construction materials from clean and site dedicated equipment, the decontamination of transport vehicles handling contaminated soil prior to entering the Support Zone, the decontamination of personnel and clothing prior to entering the Support zone and for the physical segregation of the Support Zone and Exclusion Zone.

c) Clean Zone - This area is the remainder of site and is defined as being an area outside the zone of significant air, soil or surface water contamination. The Clean Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work site. The function of the Clean Zone includes:

i) An entry area for personnel, material and equipment to the Exclusion Zone;
ii) An exit area for decontaminated personnel, materials and equipment from the Exclusion Zone;
iii) The housing of site special services; and
iv) A storage area for clean, safety and work equipment.

A.8 COMMUNICATIONS

Telephone service will be provided to the site of work during major construction activities. Emergency numbers including police, fire, ambulance, hospital, and appropriate Regulatory agencies will be prominently posted near each phone.

A.9 EMERGENCY AND FIRST AID EQUIPMENT AND SUPPLY

The safety equipment listed below will be located and maintained within the Exclusion Zone in appropriate locations as directed by the Safety Officer.

a) portable emergency eye wash and shower
b) three twenty pound ABC type dry chemical fire extinguishers
c) two self contained air full face respirators

One hand-held emergency siren and two complete sets of Level B protective equipment shall be located and maintained in the "Clean" zone.

A.10 EMERGENCY CONTINGENCY AND RESPONSE PLAN

A.10.1 Off-Site Contingency Plan

Prior to commencing work involving the excavation, handling and disposal of potentially contaminated material, Duracell will coordinate the development of an off-site emergency contingency plan. This plan is intended to provide immediate response to a serious site occurrence such as explosion, fire or migration of significant quantities of toxic or hazardous material from the site into adjacent public areas.

Coordination meetings will be held with appropriate authorities which may include State, Engineer, Fire Department, Hospital, State and City Police, State Department of Transportation, Montgomery County Health Department and Civil Defense officials. The meetings will identify the Emergency response coordinator through whom all information and coordination will occur in the event of an incident. Plans will be developed, or existing plans incorporated into the master plan, for

i) evacuation of adjacent areas,

ii) fire fighting procedures,

iii) transport of injured personnel to medical facilities,

iv) priority transportation routes, and

v) coordination and/or modification of highway operations.

An emergency medical facility for non-chemical and chemical accidents will be designated prior to commencing any work on site.

Techniques and recommended procedures for immediate first aid emergency response will be developed with local medical facilities.

A.10.2 On-Site Contingency Plan

a) In the event of injury to on-site personnel or contact with hazardous materials, the following protocol will be followed:

i) in the event of injury, notify the Safety Officer, and the Engineer,

ii) contact the closest medical center and describe the injury (closest medical center will be established prior to commencing any work on site),

iii) decontaminate personnel and administer appropriate emergency first aid, and

iv) transport personnel to the defined medical facility along a predefined route.

b) Fire extinguishers will be maintained in strategic locations within the site to combat localized fires. Personnel will be trained in fire fighting procedures and will be equipped with self contained air when involved in such operations.

c) In the event of significant release of toxic or hazardous vapors from any container or excavation, the source of such vapors will be immediately backfilled or covered with fill. Equipment operators will utilize self contained air respirators during such operations. Alternate plans of contaminant removal will be developed and submitted to the Engineer prior to recommencing work in the area.

A.11 PERSONAL SAFETY AND RELATED EQUIPMENT

All on-site personnel will be equipped with personal safety equipment and protective clothing appropriate for the hazardous material being handled and the nature of work being completed. All safety equipment and protective clothing will be kept clean and well-maintained.

Safety equipment and apparel as required for general work and excavation work within the Exclusion Zone will consist of:

a) Liquid resistant, splash resistant, full coverage, disposable outerwear including coveralls ("saranex") and nitrile/butyl gloves,

b) Hardhats,

c) Safety shoes or boots,

d) Rubber overshoes or overboots,

e) Full face respirators with dual organic vapor, and particulate filters; self-contained breathing apparatus or other supplied air system as necessary to conduct remedial action in a safe manner.

In addition to the above-noted safety equipment, all personnel directly handling capacitors shall be equipped with viton gloves.

Additional protective equipment usage guidelines to be implemented include:

a) All prescription eyeglasses in use on the site will be safety glasses. Contact lenses will not be permitted.

b) All disposable or reusable gloves worn on the site will be nitrile/butyl gloves with latex surgical gloves worn under nitrile/butyl gloves.

c) During periods of respirator usage in contaminated areas, respirator filters will be changed daily or upon breakthrough, whichever occurs first.

d) Footwear used on site will be work shoes or boots, and will be covered by rubber overshoes when entering or working in the Exclusion Zone or Contaminant Reduction Zone.

e) On-site personnel unable to pass a respirator fit test will not enter or work in the Exclusion Zone or Contaminant Reduction Zone.

f) All on-site personnel will wear an approved hardhat when present in the Exclusion Zone.

g) All personal protective equipment worn on site will be decontaminated at the end of each work day. The Safety Officer will be responsible for ensuring individuals decontaminate personal protective equipment before reuse.

h) Duct tape will be used to ensure that disposable coveralls and gloves are tightly secured when personnel are working within contaminated zones.

A.12 RESPIRATORY PROTECTION

Respiratory protection, as appropriate for all on-site personnel, will be mandatory during all on-site construction activities. As a minimum, all on-site personnel will be required to wear full face air purifying respiratory protection when working in the Exclusion Zone.

Levels of respiratory protection have been chosen consistent with potential airborne hazards. The selection of appropriate protection is based upon the potential presence of compounds with the lowest recommended threshold limit value.

In the absence of additional air monitoring information, the following levels of respiratory protection will be required:

Total Organic Vapor Concentration (ppm)	Level of Respiratory Protection Required
0 - 25	Full face air purifying protection
greater than 25	Supplied air system

All major equipment, handling potentially contaminated soils, will be equipped with a source of compressed air for air supplied respirators, should they be required.

The Safety Officer will be responsible for implementing, maintaining and enforcing the respirator program.

On-site personnel unable to pass a respirator fit test will not enter or work in the Exclusion Zone or Contaminant Reduction Zone.

A.13 PERSONAL HYGIENE

The Safety Officer will be responsible for, and ensure that all personnel performing or supervising remedial work within a hazardous work area, or exposed or subject to exposure to hazardous chemical vapors, liquids, or contaminated solids, observe and adhere to the personal hygiene-related provisions of this section.

On-site personnel found to be disregarding the personal hygiene-related provisions of this plan will be barred from the site.

The following equipment/facilities will be provided for the personal hygiene of all on-site personnel:

a) Suitable disposable outerwear, gloves, and footwear on a daily or as-needed basis for the use of on-site personnel,

b) Contained storage and disposal for used disposable outerwear,

c) Personnel hygiene facilities complete with change area, showers, toilets and washbasins with contained storage for all wash waters,

d) Lunch area, and

e) A smoking area.

The following regulations for personnel working within the Exclusion Zone will also be enforced:

a) On-site personnel will wear disposable outerwear and gloves at all times whenever entering or working in the Exclusion Zone or Contaminant Reduction Zone.

b) Used disposable outerwear will not be reused, and when removed, will be placed inside disposable containers provided for that purpose.

c) Smoking will be prohibited except in a designated smoking area.

d) Eating and drinking will be prohibited except in the designated lunch or break area.

e) Soiled disposable outerwear will be removed prior to entering the lunch area, and prior to cleansing hands.

f) On-site personnel will thoroughly cleanse their hands and other exposed areas before entering the smoking or lunch area.

g) All personnel working in the Exclusion Zone or Contaminant Reduction Zone will shower and change to street clothes prior to leaving the site.

A.14 AIR MONITORING

A.14.1 Protocols

During the progress of active remedial work, air quality will be monitored in and around each active work location. Sampling will be conducted on a regular periodic basis, and additionally as required by special or work-related conditions. Air leaving the active work locations will be monitored by downwind air sampling. Air sampling will be conducted for particulates (Total Suspended Particulates; Total PCB; Total Dioxins; Total Benzofurans) and VOC vapors. Any departures from general background will be reported to the Engineer who will, in conjunction with the Safety Officer, determine when operations should be shut down and restarted.

Instruments required for air monitoring shall include an organic vapor photoinizer or organic vapor analyzer, explosimeter, personal dust monitors, and a continuous total organic vapor monitor alarm.

Contractor air monitoring equipment shall be operated by personnel trained in the use of the specific equipment provided and shall be under the control of the site Safety Officer. All monitoring equipment used within the Exclusion zone shall be intrinsically safe.

Should the organic vapor level in any active working location exceed 100 ppm for any single reading, or 50 ppm for any two successive readings, or should the explosimeter indicate in excess of 20 percent of the lower explosive limit on any single reading, then that work location shall be shut down and evacuated upwind. Work shall not resume at such a work location until authorized by the Engineer and site Safety Officer.

Personal dust monitors shall be located upwind and downwind of activities involving the handling of contaminated material and on the highest risk person at both the interim storage cell and the contaminated soil excavation areas. Samples collected shall be analyzed on a daily basis for total suspended particulates (TSP). Results of the TSP analysis shall be verbally given to the Engineer within 24 hours of sample collection. Samples which show an excursion over 150 ug/m^3 will be analyzed for total PCB, Dioxin and Dibenzofuran.

The Contractor shall be responsible for appropriate respiratory protection during all work activities. As a minimum, the Contractor shall ensure that all personnel working within or adjacent to an active work location are supplied with and use full face respiratory protection.

A wind direction indicator shall be installed by the Contractor at each active work location.

A.14.2 Reporting

The results of air monitoring programs will be reported on specific forms and will include the following information:

i) Site Location/Date

ii) Work Process/Operation Name

iii) NIOSH Method Used

iv) Air Flow Calibration Record

v) Temperature, Pressure, Humidity at Sample Location

vi) Area Sampling Location Diagram

vii) Personal Samples

- Name of Worker
- Location of Workers

viii) Area Sample Description/Location

ix) Sampling Data

- Pump I.D.
- Flow Rate
- Sample Filter/Tube Number
- Pump On/Off (time)
- Volume Air Collected (liters)
- Lab Sample Number

x) Analysis Results (mg/m^3, ppm)

xi) Field Notes

- Description of Operations and Complaints/Symptoms
- Chemicals/Materials/Equipment in Use
- Engineering/Administration Controls in Effect
- Personal Protective Equipment in Use
- Sampling Observations/Comments

xii) Sample Submission

- Name, Location
- Chemist/Industrial Hygienist Name
- Principal Air Monitor
- Reviewed by

In addition, all daily air monitoring activities will be recorded in a hard cover log book which will be maintained on site at all times by the Safety Officer.

A.15 CONTAMINANT MIGRATION CONTROL

All vehicles and equipment used in the Exclusion Zone will be decontaminated in the Decontamination Zone prior to leaving the site of work. The Safety Officer and Engineer will certify that each piece of equipment has been decontaminated prior to removal from site.

Decontamination will consist of the thorough cleaning of equipment with a high pressure steam cleaning unit, and will be performed at the equipment decontamination facility. Decontamination wash waters will be contained in an on-site storage tank. Washwaters will be sampled prior to disposal in accordance with State and Federal regulations.

Personnel engaged in vehicle decontamination will wear protective equipment including disposable clothing and respiratory protection.

A.16 PARTICULATE EMISSION CONTROL

During remedial action, a dust control program will be implemented and strictly enforced to minimize the generation and off-site migration of fugitive particulate emissions. Excavations and excavated material shall be kept moist while uncovered due to site activities. Decontamination wash waters from the decontamination area shall be used to keep excavations moist.

All roadways, designated work areas and other possible sources of dust generation will be controlled by application of water as required.

A.17 POSTED REGULATIONS

"No Smoking" signs will be posted at the site entrance and on the perimeter of the Exclusion Zone in addition to signs which state "Warning, Hazardous Work Area, Do Not Enter Unless Authorized". In addition, a notice directing visitors to the Security Officer will be posted at the site entrance.

Safety regulations and safety reminders will be posted at conspicuous locations throughout the site.

A.18 SAFETY MEETINGS

The Safety Officer will conduct weekly safety meetings which will be mandatory for all site personnel. The meetings will provide refresher courses for existing equipment and protocols, and will examine new site conditions as they are encountered.

Additional safety meetings will be held on an as required basis.

Should any unforeseen or site peculiar safety related factor, hazard, or condition become evident during the performance of work at this site, it will be brought to

the attention of the Engineer in writing as quickly as possible, for resolution. In the interim prudent action will be taken to establish and maintain safe working conditions and to safeguard employees, the public, and the environment.

A.19 SITE SECURITY

The site will be secured on a 24-hour basis for the duration of the project to prevent uncontrolled, unauthorized access to the site. Security may include an unarmed guard.

As part of the site security, the Security or Safety Officer will:

a) Limit vehicular access to the site to authorized vehicles and personnel only,

b) Maintain a visitors and site personnel sign-in/sign-out log, and a log of all security incidents, and

c) Provide initial screening of site visitors.

A.20 ON-SITE METEOROLOGICAL STATION

A continuously operational site meteorological station with live and recorded monitoring of temperatures, wind speed, wind direction and humidity, will be installed and maintained on-site for the duration of all Phase I excavation activities.

APPENDIX B

SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

B.1 INTRODUCTION

The sampling and analysis plan at the former P.R. Mallory Plant site in Crawfordsville, Indiana will include the collection of surface and subsurface soil samples; stream sediment samples; surface water samples; ambient air samples; and groundwater samples.

Samples to be collected are intended for chemical analysis to define areas of residual contamination requiring further remediation. Therefore, it is imperative that all sampling protocols be strictly followed to eliminate any possible cross-contamination between samples or to prevent any other bias in the field sampling.

Sampling activities may involve contact with potentially contaminated soils or material. Therefore, all sampling activities shall be carried out in strict accordance with the Health and Safety Plan outlined in Appendix A.

B.2 SOIL SAMPLING

Soil sampling shall be carried out in accordance with the sampling protocols contained herein. Sampling locations are indicated on Figure B-1 and the number of samples to be collected is summarized on Table B-1.

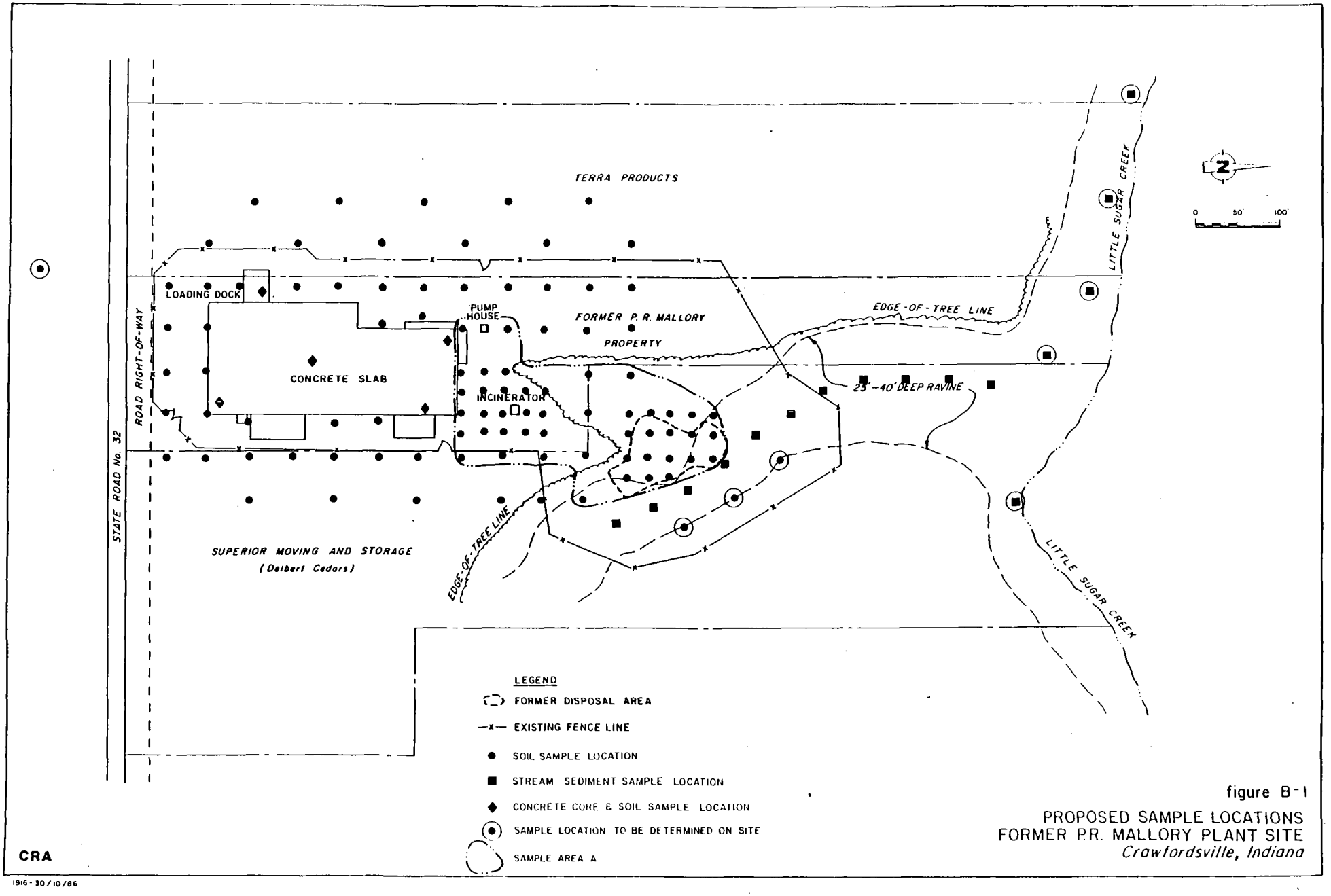

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figure B-1

PROPOSED SAMPLE LOCATIONS
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

1916 - 30/10/86

TABLE B-1

SUMMARY OF FIELD SAMPLES
FORMER P.R. MALLORY PLANT SITE, CRAWFORDSVILLE, INDIANA

Sample Type	Number of Samples	Trip Blanks	Field Blanks	Blind Duplicates	Matrix Spike	Total
Groundwater (per round)	7	2	1	1	1	12
Surface Water	11	-	1	1	1	14
Ambient Air	8	-	2	2		12
Soil/Sediment	121	-	12	12		145
Concrete	5	-	1	-		6

B.2.1 SAMPLE PREPARATION AND HANDLING

B.2.1.1 Equipment Decontamination

All sampling equipment which may come in contact with potentially contaminated materials shall be decontaminated prior to field use and after each sample is collected to prevent cross-contamination of the soil samples. Duplicate samples shall be collected concurrently with original samples, therefore, sampling equipment will not be decontaminated before collection of the duplicate. Decontamination of equipment will be performed as follows:

1. clean water wash to remove all visible foreign matter;
2. rinse with deionized water;
3. rinse with reagent-grade acetone;
4. rinse with 1,1,1-trichloroethane; and
5. air dry on clean plastic sheet.

Fluids used for cleaning shall not be recycled. All wash water, rinse water and decontamination fluids shall be stored in containers on site as outlined in Section B.2.1.6

B.2.1.2 Soil Sample Collection

A split spoon sampler shall be used to retrieve soil and sediment sample, as outlined below:

1. A new pair of disposable gloves will be used at each sampling location and for the preparation of samples from different vertical zones at each individual location.

2. Prior to use at each sampling location, all sampling equipment not previously decontaminated will be cleaned in accordance with Section B.2.1.1.

3. A stainless steel split spoon sampler will be manually driven approximately fifteen (15) inches into the ground.

4. The split spoon sampler will be retrieved and opened upon a double sheet of polyethylene or a sheet of aluminum foil.

5. Using a clean cutting tool, a two- to three-inch section will be removed from the bottom of the core. The remaining core will be cut in half to segregate the top six inches of soil from the underlying six inches. The top six-inch core will be cut in half longitudinally. A continuous sample will be removed from the center of the

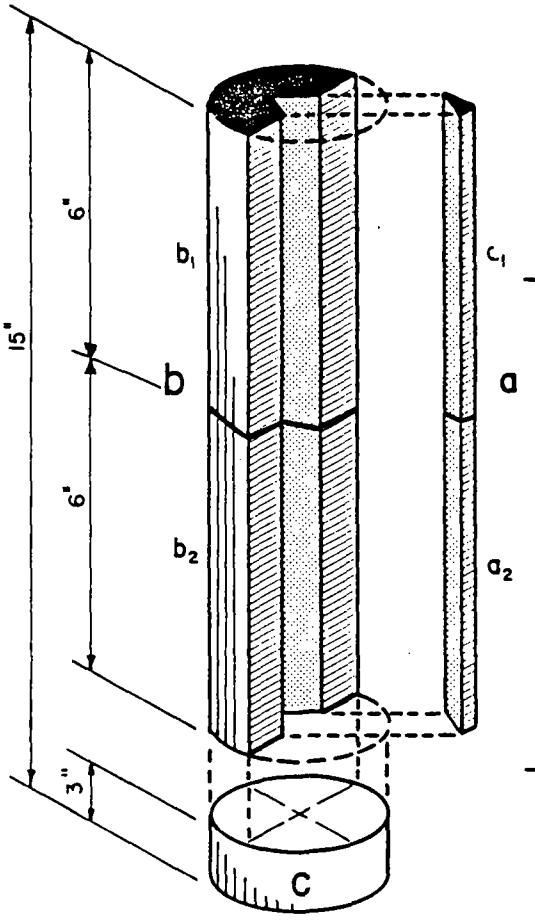
exposed portion of the top core as illustrated in Figure B-2. The sample will be removed using clean stainless steel spatulas, spoons or other appropriate sampling equipment. The sample shall be placed in a clear, prelabeled, eight-ounce glass jar and sealed with a teflon lined cap.

6. All equipment used during the sampling procedures which may have come in contact with contaminated soils, shall be decontaminated in accordance with Section B.2.1.1. Latex gloves used during the collection of the sample shall be disposed of in accordance with Section 2.1.6.

7. If necessary a second core shall be collected immediately adjacent to the first to retrieve sufficient material for analysis. Where a second core is required for analysis or as a duplicate sample, the collected samples shall be composited and homogenized in a clean stainless steel bowl prior to being placed in the sample jars.

8. A new pair of disposable gloves and clean sampling tools shall be used to prepare the sample from the underlying six inches in accordance with the procedures described for preparation of the surface sample.

All surficial soil samples shall be analyzed for total PCBs; ten percent of the soil samples collected



TYPICAL SOIL CORE

a

PORTION OF SAMPLE FOR CHEMICAL ANALYSIS

- CONTACT WITH UNSTERILIZED MATERIALS IS NOT ACCEPTABLE
- CONTAINER : PRECLEANSED 500 ml. CLEAR GLASS
- GASKET - TEFLON OR ALUMINIUM FOIL
- a_1 – SURFACE SAMPLE FOR CHEMICAL ANALYSIS
- a_2 – SUB-SURFACE SAMPLE FOR FUTURE ANALYSIS, IF REQUIRED

b

PORTION OF SAMPLE TO BE RETAINED FOR GEOLOGIC RECORDS (IF REQUIRED)

- CONTACT WITH UNSTERILIZED MATERIALS IS NOT A PROBLEM
- CONTAINER : - CLEAN GLASS JAR
  - CLEAR GLASS IS SUITABLE
- GASKET - ANY SUITABLE GASKET
- b_1 – SURFACE SAMPLE FOR GEOLOGIC RECORD
- b_2 – SUB-SURFACE SAMPLE FOR GEOLOGIC RECORD

c

PORTION OF SAMPLE TO BE DISCARDED

figure B-2

SAMPLE SELECTION DETAILS
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

CRA

1916-30/10/86

shall be analyzed for dioxins and dibenzofurans. In addition to the above, ten percent of all samples collected from Sample Area A, as illustrated on Figure B-1, will be analyzed for priority pollutant base, neutral and acid extractables and volatile organic compounds.

B.2.1.3 Sampling Beneath Concrete Slab

A portable core drill equipped with a four-inch diameter core will be used to core the existing concrete slab at the proposed sampling locations. The concrete cores will be retained as an additional sample; cores will be placed in zip-lock plastic bags, labelled and sealed within a second zip-lock plastic bag. The core shall be analyzed for total PCBs.

Subsurface soil samples will be taken beneath the slab using a split spoon sampler as outlined in Section B.2.1.2. The five soil samples taken from beneath the concrete slab shall be analyzed for total PBCs.

B.2.1.4 Sediment Sample Collection

Sediment samples will be collected by driving a three-inch diameter split spoon sampler 15 inches into the sediment at the locations to be sampled following the protocol described in Section B.2.1.2. The five subsurface

soil samples shall be analyzed for PCBs; one subsurface soil sample shall also be analyzed for dioxins and dibenzofurans.

Sediment samples will be collected in precleaned, prelabeled 500 mL glass jars as described in Section B.2.2.5. All sediment samples shall be analyzed for total PCBs; the background sample and one downstream sample from Little Sugar Creek as well as one sample from the ravine shall also be analyzed for dioxin and dibenzofuran.

B.2.1.5 Soil Sample Handling

Each soil sample jar shall be prelabeled, immediately before the samples are collected, with the following information:

1. project name - 1916 - Conestoga-Rovers & Associates
2. project location - Crawfordsville, Indiana
3. sample identification number;
4. date; and
5. the sampler's name.

The label will be sealed in clear plastic tape to ensure it does not peel off or become damaged.

Following collection of the sample, each sample jar shall be enclosed in a polyethylene zip-lock bag and sealed. Each sample to be transported to the analytical laboratory will be logged on the Sample Transport Chain of Custody Sheet. Samples will be stored in an ice chest packed with vermiculite to cushion the samples during shipment. The ice chest shall be sealed with fibreglass strapping tape; a security seal shall be placed on the ice chest prior to shipping.

B.2.1.6 Waste Material Handling

All waste material generated from the soil sampling program including coveralls, gloves and discarded ground sheets and decontamination fluids shall be placed in 55-gallon drums and securely capped. Solid and liquid waste materials will be placed in separate containers. All waste material placed in the containers shall be logged and the containers shall be stored on site within the interim staging cell.

Containers shall be placed in interim storage at the end of each day. The final disposition of sampling material shall be carried out in accordance with Section 2.6 of the RAWP.

B.2.1.7 Sample Station Survey

All sampling stations will be marked with a survey stake and identified by a specific location number. All sampling locations will be referenced to horizontal control previously established on site; the elevation of each sampling location will also be determined.

B.2.1.8 Soil Sampling Procedure Modifications

As field conditions dictate and as approved by USEPA's OSC, the soil sampling and handling procedures may be modified to control cross-contamination of samples and/or expedite work progress.

B.3 AMBIENT AIR SAMPLING

B.3.1 Sampling

Two personal sampling pumps will be used at each of four sampling locations. One of the pumps will be designated for collection of particulate PCB, and the second one will be utilized for the collection of PCB in the gaseous phase.

The pump dedicated to particulate sampling will be equipped with a filter cassette containing a 13 millimeter (mm) glass fiber filter. The pump will be set to collect at a continuous flow rate of 0.2 Litres/minute (L/min.). On completion of sampling, the time of sample collection will be noted and the glass fiber filter will be transferred to a 40 mL glass vial for shipment to the analytical laboratory.

The second pump, dedicated to collection of PCB in vapor or gaseous phase, will be equipped with a florisil tube (100 mg/50 mg). The tube will be opened immediately prior to initiating sampling and attached in-line with the pump. A constant flow rate of 0.5 L/min will be used in order to reduce the possibility of break through on the sample tube. At the close of the sampling period, the total time will be noted and the sample tube will be removed and capped securely with plastic caps on both ends. The samples will be refrigerated until and during shipment in order to reduce the possibility of loss of sample through volitization.

Samples will be shipped via overnight courier to the designated laboratory under Chain of Custody.

B.3.2 Sample Pump Calibration

All sampling pumps will be calibrated with a primary calibration unit (e.g. Roots meter) prior to commencing sample collection. Daily calibration will be made with a secondary calibration unit (e.g. rotameter). Daily calibration will take place prior to the sampling period and at the close of the sampling period to verify that the flow rates remained constant throughout the sampling period. This data will be maintained throughout the project as part of the air monitoring data.

B.4 GROUNDWATER SAMPLING

All monitoring wells installed during this program will be sampled according to the following protocols. Table B-1 summarizes the number of samples to be collected.

1. New disposable latex gloves will be used when sampling each well. Additional glove changes will be made for each sampling.

2. Upon removal of the locking and protective caps, measurements of organic vapors of the air in the well head will be made with a HNU meter.

3. The sampler shall measure and record the depth to water in each well to the nearest 0.01 foot using an electric tape. The electric tape will be decontaminated prior to use in each well.

4. Prior to sampling, each well will be prebailed using a stainless steel bottom filling bailer to remove a minimum of three to five times the standing water volume in the well or until dry. In the event that a well is bailed dry prior to achieving three well volumes, groundwater will be permitted to recover to a level sufficient for sample collection; the time the well was baled dry will be noted and well recovery will be monitored. Upon recovery, one final bailer volume will then be used for sample collection. Prior to use in the initial and all subsequent monitoring wells, the bailer will be precleaned with distilled water, methanol, hexane, methanol and distilled water rinse sequence. Purged groundwater not used for sampling will be collected and contained.

5. After the required standing well water has been purged or immediately after well development, water samples will be collected using a bailer attached to a nylon rope. The bailer will be precleaned using the prescribed sequence from Section B.4.0 prior to use in any monitoring wells. New nylon rope will be used for each monitoring well.

6. All groundwater samples collected for PCBs, dioxin, dibenzofuran and inorganic metals will filtered in the field as soon as possible after collection. In the case of the inorganic metals, filtering will be done prior to the addition of any preservatives. Filtering will be undertaken with a vacuum filtration device and 0.45 micron filter paper. Groundwater samples for collected priority pollutant volatiles will not be field filtered.

7. Samples will be collected from each well, for the analysis of indicator parameters as follows:

(a) Priority Pollutant Volatiles

Samples for priority pollutant volatile analysis will be collected in two 40 mL amber glass septum vials. The vials will be completely filled and will be free of air bubbles. Samples will be immediately placed in coolers and ice.

(b) PCB

Samples for PCB analysis will be collected in one-litre amber glass bottles, with no preservative added.

(c) Dioxin and Dibenzofuran

Samples for dioxin and dibenzofuran will be collected in one-litre amber glass bottles.

(d) Inorganic Metals and Alkalinity

Samples for inorganic metals (Ca, Mg, Na and K) and Alkalinity will be collected in 500 ml plastic bottles preserved with HNO_3 to a pH of less than 2.

(d) Inorganic Non-Metals

Samples for inorganic non-metals will be collected in one-litre plastic bottles with no preservatives added. The samples will be stored on ice and cooled to 4°C.

8. A blind duplicate sample and matrix spike sample will be collected at a frequency of one per sample round.

9. A bailer rinse water sample will be collected at a frequency of one per sample round. The rinse water sample will consist of distilled water poured into, and then sampled out of, a bailer cleaned using the prescribed rinse sequence. This will provide a quality assurance check on the field decontamination procedures, employed for the bailers between wells.

10. A matrix spike sample will be collected at a frequency of one per sample round. The matrix spike sample will be collected at twice the normal volume outlined in (7) above.

11. All disposable gloves, rinsings and nylon ropes will be collected and contained on-site in an interim storage cell.

B.5 SURFACE WATER SAMPLING

Surface water samples will be collected, if possible, at all stream sediment sampling locations.

Surface water samples will be collected by the grab sample method directly into precleaned sample containers. A one-litre wide mouth glass jar will be collected for analysis from each location.

B.6 ANALYTICAL PROTOCOLS

B.6.1 GENERAL

Samples may contain hazardous constituents, therefore, samples shall be handled at all times with the utmost care to reduce any threat to the public or the environment.

All analytical work shall be performed by a qualified laboratory or laboratories approved by USEPA.

B.6.2 SAMPLE DELIVERY

Samples shall be delivered to the analytical laboratory by commercial courier under approved chain of custody procedures. Laboratory personnel must complete the chain of custody form upon receipt of the samples in accordance with Section B.6.6.

B.6.3 ANALYTICAL PROTOCOLS

Analytical protocols for determining specific parameters shall be as outlined on Table B-2.

TABLE B-2

ANALYTICAL METHODS SUMMARY

Sample	Parameter	Method for Extraction/Cleanup	Method for Analyses
Soil/Sediment	Total PCBs	3540(1)/3550(1)	8080(1)
	Dioxin/Furan		8280(1)
	Priority Pollutant VOCs	5010/5020/5030(1)	8240(1)
	Priority Pollutant B/N/As (2)	3540/3550(1)	8270(1)
Air	Total Particulate PCBs		5503(3)
	Vaporous PCBs		5503(3)
Groundwater	Total PCBs	3510/3520(1)	8080(1)
	Dioxin/Furan	8280	8280(1)
	Priority Pollutant Volatiles	5010/5020/5030(1)	8240(1)
Surface Water	Total PCBs	3510/3520(1)	8080(1)
	Dioxin/Furan	8280	8280(1)
Concrete Core	Total PCBs	3540/3550(1)	8080(1)
	Dioxin/Furan	8280	8280(1)

Notes:

1. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, Second Edition, SW-846, United States Environmental Protection Agency, 1984.

2. Base, neutral and acid extractable compounds.

3. NIOSH Manual of Analytical Methods, Volume 1, Third Edition, NIOSH Publication No. 84-100, U.S Department of Health and Human Services.

B.6.4 QUALITY ASSURANCE/QUALITY CONTROL

Laboratory QA/QC required by the Methods specified in Section B.6.3 shall be strictly followed. Field blanks and duplicate samples shall be collected during sampling; ten percent of the samples collected shall be field blanks and ten percent shall be duplicates as outlined in Table B-1.

B.6.5 SAMPLE BOTTLE PREPARATION

.1 Containers

Sample jars will be supplied by the analytical laboratory for the collection of all samples. All sample bottles will be precleaned by the laboratory and stored at the sampling site in an area and in manner to prevent breakage and contamination of the cleansed bottles. Trip blanks for VOC will be included with bottles shipped to the site.

.2 Cleaning Protocol

All sample containers to be used for collection of samples for chemical analysis will be pre-cleaned and sealed by the laboratory prior to shipment to the site.

B.6.6 CHAIN OF CUSTODY PROCEDURES

.1 Laboratory Custody Procedures

The laboratory will designate a "sample custodian" and an alternate to act in his absence. In addition, the laboratory will set aside as a "sample storage security area" an isolated room which should be secured and have limited access.

The custodian will receive the incoming samples and indicate receipt by signing the Sample Chain of Custody Record Sheet accompanying the samples and retain the sheet as a permanent record. The custodian should check to ensure that the sample numbers indicated on the Custody Form correspond with the sample jar identification numbers. All incoming samples will be entered into a laboratory sample logbook.

Immediately upon receipt, the custodian will place samples in the sample room which shall be secured at all times except when samples are removed or replaced by the custodian.

The custodian shall maintain the integrity of the samples by appropriate storage and must distribute samples to the personnel who are to perform tests.

The analyst must record information in his laboratory notebook or analytical work sheet, that describes the samples, the procedures performed and the results of the tests. The notes must be retained as a permanent record in the laboratory and should include any abnormalities which occurred during the testing procedure.

Standard methods of laboratory analysis must be used as described in Section B.6.3.

Laboratory personnel are responsible for the care and custody of a sample once it is handed over to them and shall be prepared to testify that the sample was in their possession and viewed or secured in the laboratory at all times from the moment it was received from the custodian until the tests were run.

Once the sample testing is completed, the unused portion of the sample together with all identifying tags, laboratory records, and other documentation of work must be returned to the custodian for filing in a secured file location.

.2 Sample Chain of Custody Record Sheet

The Sample Chain of Custody Record Sheet will be introduced into the analytical chain at the time of soil sample collection. The Sample Chain of Custody Record Sheet will be completed for each sample collected and will accompany the sample until it is ultimately disposed of. Figure B-3 presents an example of the Sample Chain of Custody Record Sheet.

The use of the custody sheet will be as follows:

1. The Site Sampler will fill in all required information from the sample labels upon collection of soil samples.

2. The original custody form will be sealed in plastic and placed within the shipping container.

3. The shipping container will be sealed with a numbered security seal.

4. Custody will be transferred to the analytical laboratory which will check the integrity of the security seal upon receipt and retrieve the custody form from the shipping container.

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Telephone (519) 884-0510

SHIPPED TO (Laboratory name):

CHAIN OF CUSTODY RECORD

PROJECT Nº.

PROJECT NAME :

SAMPLER'S SIGNATURE _____ (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	Nº. OF CONTAINERS	REMARKS
				TOTAL Nº. OF CONTAINERS			

RELINQUISHED BY: 1 (SIGN)	DATE / TIME	RECEIVED BY: 2 (SIGN)
RELINQUISHED BY: 2 (SIGN)	DATE / TIME	RECEIVED BY: 3 (SIGN)
RELINQUISHED BY: 3 (SIGN)	DATE / TIME	RECEIVED BY: 4 (SIGN)
RELINQUISHED BY: 4 (SIGN)	DATE / TIME	RECEIVED BY: 5 (SIGN)

METHOD OF SHIPMENT:	SHIPPED BY:	RECEIVED FOR LABORATORY BY: (SIGN) _____	DATE / TIME
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN) _____	DATE / TIME

WHITE – RECEIVING LABORATORY COPY
YELLOW – SHIPPER'S COPY
PINK – CRA LABORATORY COPY
GOLDEN ROD – CRA OFFICE COPY

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figure B-3

SAMPLE CHAIN OF CUSTODY FORM
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

5. Sample disposal will be done by the laboratory. Upon disposal, the laboratory will sign the next open "Relinquished by" box, and words "Disposed" will be written in the "Received by" box.

APPENDIX C

OBSERVATION WELL INSTALLATION PROTOCOLS

TABLE OF CONTENTS

LIST OF FIGURES

C.1 INTRODUCTION

Seven observation wells will be installed at five locations during this program to determine the following:

i) site stratigraphy,

ii) horizontal and vertical direction of groundwater flow, and,

iii) distribution of groundwater contamination, if any.

The protocols to be used for the monitoring well installation are described in the following sections.

C.2 DRILLING PROCEDURES

At each proposed well nest location the deep borehole will be advanced initially.

The boreholes will be advanced with hollow stem augers with an inside diameter of 4 1/4-inches. Split spoon samples will be collected during augering to identify soil materials as outlined in Section C.3. All materials will be described and classified according to the Unified Soil Classification System.

At the boring locations outside the security fence temporary work sites will be established. At each of these sites, an area around the drilling rig will be demarcated to define a "dirty work zone." Also, a plastic groundsheet overlain by plywood will be lain down over all areas of work travel within the delineated potentially "dirty working zone." All drill cuttings will be contained on the plastic ground sheet.

C.3 SOIL SAMPLING

Continuous split spoon samples will be collected for the uppermost 15 feet; split spoon samples will be collected at 5-foot intervals thereafter. The split spoon sampler will be attached to the drill rod and driven into the soil the full depth (24 inches) using a 140-pound hammer, free-falling 30 inches. The driving resistance (number of hammer blows) will be recorded for each six-inch increment of penetration. If the soil is loose, wet, or in any way unconsolidated, clean basket retainers will be used to retain the soil in the split spoon. Between each sampling the split spoon will be cleaned as described in Section C.6.

Soil samples collected from the split spoon will be described and classified according to the Unified Soil Classification System and then stored in glass jars for

geologic record. All samples retained for geologic record will be stored on site.

During sampling, HNU readings will be taken and recorded as each split spoon is opened, as an indication of volatile organic contamination. Also, HNU readings of the head space of the sample jars will be taken and recorded.

C.4 OBSERVATION WELL CONSTRUCTION

A single observation well will be completed in each borehole. Each monitoring well will be constructed with five feet of 6-slot, 2-inch diameter stainless steel well screen joined to 2-inch diameter stainless steel riser with threaded and coupled joints. Number 4 silica sand will be placed in the borehole annulus to a depth of two feet above the top of the well screen. Should natural conditions prove difficult for sand pack placement, the native materials will be allowed to collapse around the screen. A 2-foot thick bentonite pellet seal will be placed in the annulus above the sand pack material. The bentonite pellets will be high density, approximately 3/8-inch diameter and will be tamped into place to ensure that a good seal is formed. The annulus above the seal will be backfilled with a cement/bentonite grout to ground surface. Surface protection consisting of a 4-inch diameter steel casing, complete with a

lockable cap, will be embedded in the cement/ bentonite grout.

A typical monitoring well installation is shown on Figure C-1.

C.5 WASTE HANDLING

All soil cuttings brought to the surface will be collected in 55-gallon DOT approved drums and transferred to the on-site interim staging cell. Any borehole fluid will also be contained and collected.

All coveralls, gloves, etc. will be collected in plastic bags daily and placed nightly in the designated interim storage area.

C.6 EQUIPMENT CLEANING

Prior to mobilization of the drill rig, the rig and all associated equipment will be thoroughly steam cleaned to remove oil, grease, mud and other foreign matter. Subsequently, before initiating drilling at each borehole or well location, the augers, cutting bits, samplers, drill steel, and associated equipment will be cleaned to prevent

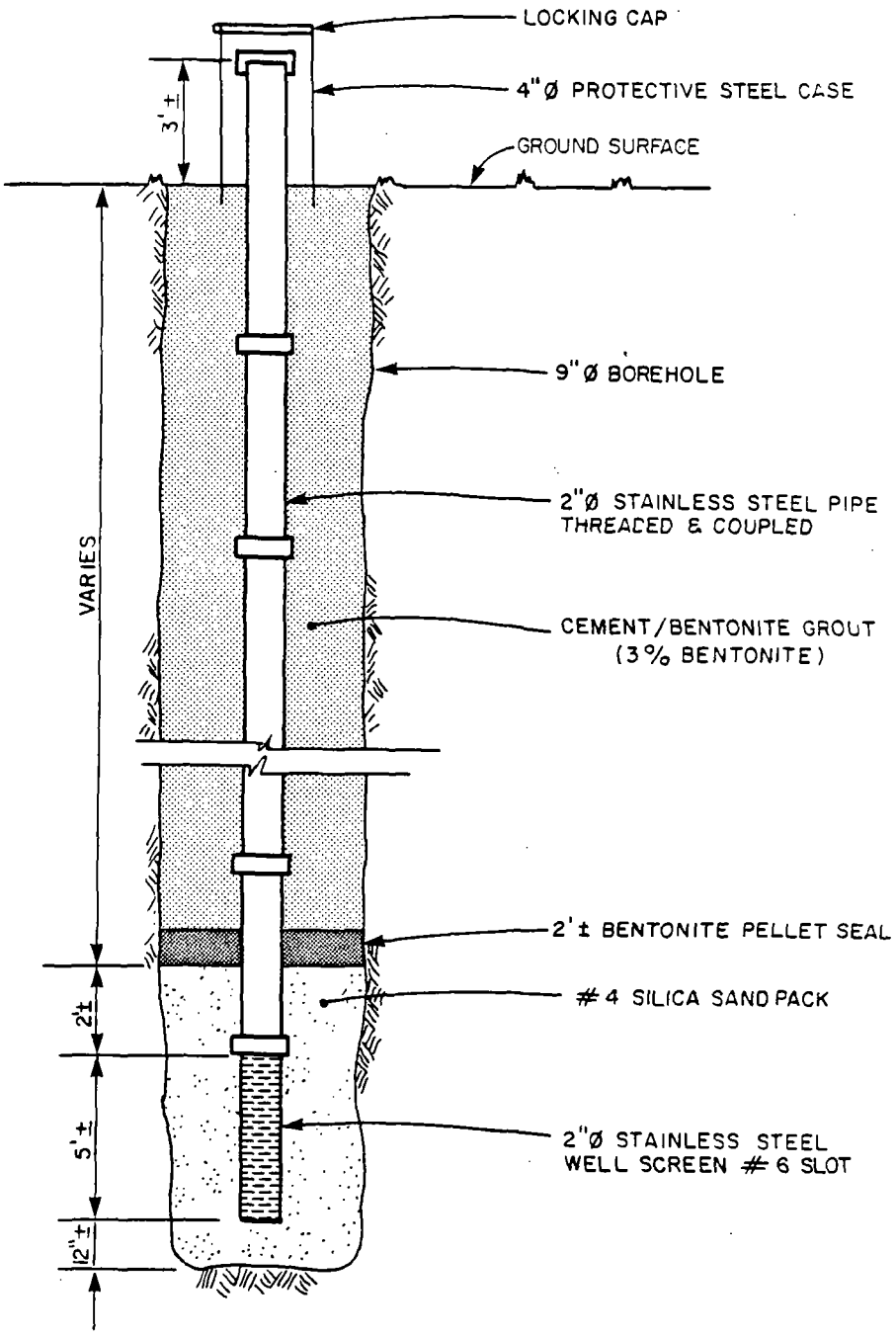

figure C-1

TYPICAL OVERBURDEN MONITORING WELL DETAIL
FORMER P.R. MALLORY PLANT SITE
Crawfordsville, Indiana

CRA

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cross-contamination from the previous drilling location. All cleaning will be conducted at the the on-site decontamination pad. Cleaning will be accomplished by flushing and wiping the components to remove all visible sediments followed by thorough high pressure wash and rinsing. Special attention will be given to the threaded sections of the drill rods and split spoons. The split spoon will be further cleaned by a methanol/hexane/methanol/deionized water rinse.

Following final rinse, openings will be visually inspected to verify they are free of soil particulates and other solid material which may contribute to possible sample cross-contamination.

Prior to installation of the monitoring wells, the casing and screens will be cleaned with a detergent high pressure wash, followed by methanol/hexane/methanol/deionized water rinses. Equipment will be protected from all forms of solvent contact between final rinse and actual use at the sample site. All solvent rinse liquids will be segregated from wash water and stored on site in the interim staging cell.

C.7 WELL DEVELOPMENT

All wells will be developed to a silt-free condition, if possible, following installation by bailing or pumping. At least three casing volumes will be removed. Field measurements of pH, conductivity and temperature will be taken of the evacuated water. Well development will continue until three consecutive and consistent readings of conductivity and pH are obtained or a maximum of five well volumes have been removed. All development water will be collected, analyzed and disposed of in accordance with State and Federal regulations.

C.8 RESPONSE TESTING

Response testing of all observation wells will be undertaken to determine the in situ horizontal hydraulic conductivity of the screened materials.

This testing involves the displacement of well water by a slug of known volume. Water level measurements are taken as the system stabilizes. Falling head tests are those which monitor a declining water level with time following the introduction of a slug. Following removal of the slug, the water level rises. This comprises a rising head test.

Prior to the introduction of the slug into a well, the slug will be decontaminated in accordance with the method described in Section C.6.0.

The methods of analysis of single well response test data are a function of the well configuration, aquifer type, and the position of the water table relative to that of the screen. The following data analysis methods will be employed as appropriate:

- Hvorslev (1951)
- Cooper et al (1967)
- Papadopulos et al (1973)
- Bouwer and Rice (1976)